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upon by a "motor" subject, and will as regularly not be reacted upon by a person reacting in the "sensory" mode. Of Lange's acute theoretical analysis of these two activities only the main points can be here given.

Taking Wundt's well known scheme of the factors in a simple reaction, he concludes that in the "sensory" reaction with the attention fully on the alert, "apperception" and "perception" fuse into one process, while the "motor" reaction does not contain an apperceptive nor a voluntary factor, but is a psychic reflex in answer to a prepared setting of the voluntary apparatus. Anatomically the former process is in connection with the cerebrum, while reasons are given for associating the latter with the cerebellum.

This distinction of Lange's is very welcome, because it promises to reconcile the results of different observers; those who like Wundt naturally drift into the "sensory" mode of reacting, getting longer times than those who favor the motor type. Furthermore, the enormous effects of practice seem now explicable as the transition from the one mode of reacting to the other. J. J.

Sul Tempo di Percezione dei Colori. Drs. G. BUCCOLA and G. BORDONI-UFFREDUZZI. Rivista di Filosofia scientifica, Anno IV, Volume V, fasc. 1^o, 1884.

This short paper gives the result of a series of careful experiments by two skilled experimenters upon the reaction time for different colors. They reacted, using the apparatus described by Buccola in his *La Legge del Tempo*, to the flash of a Geissler tube colored by the interposition of a plate of colored glass. They made their experiments from day to day at the same hour in the dark and excluded from the results any reactions that were disturbed by noise. These precautions, together with the skill and practice of the experimenters, give great regularity and consequent weight to their determinations. Red, blue, violet, and green were tested. The shortest average time was found for the last; but as this may have resulted from experimental conditions, it is not used for comparison with the others. Six series of thirty reactions each (fifteen for each observer, we judge) are given for each color. The average of the means of these is as follows:

	B.	BU.
Red,	0.153	0.160
Blue,	0.156	0.164
Violet,	0.161	0.168

In the quick perception of red they agree with Kunkel and with Ott and Prendergast. The authors suggest the advantage of study along the same lines on the evolution of the color sense and the determination of a psychometric spectrum to parallel the thermal, luminous and actinic spectra now distinguished. The subject of color perception is not without a certain practical side, since color figures so largely at present in railway and other signals. E. C. S.

Ueber die Grenzen der Wahrnehmung passiver Bewegungen. Dr. A. GOLDSCHIEDER. Centralblatt für Physiologie, No. 10.

Dr. A. Goldscheider here contributes a valuable series of observations upon the perception of passive movements. He enclosed the

two terminal joints of the left forefinger in a thick rubber sheath to exclude sensations of pressure, and with the hand well supported, rested the finger in a comfortable position by a system of pulleys and compensating weights. He now determined how slight a movement at the joint brought about by a pull upon the finger (interphalangeal) could be detected. He found for the interphalangeal joint .072, .061 and .056 cm.; for the metacarpo-phalangeal .076, .070 and .057 cm. He found, too, that the rate of motion was an important factor, the above motions being detected only if they were performed within .06 second in the former case or .08 second in the latter. A motion about half the extent of those above recorded was detected if executed within $\frac{1}{10}$ second. It must be noted that the subject is entirely passive, and that the sensations other than those arising from the motion at the joint are practically eliminated.

J. J.

Psychologie mathématique et psychophysique. P. TANNERY. Revue philosophique, Février, 1888.

Under the above heading, M. Tannery, one of the most active critics of the mathematical side of psychophysics, reviews a series of recently issued pamphlets, some of which treat of the philosophic foundations of the concepts that underlie mathematical operations, and the others of the mathematical basis of a psychophysic system. The review of the former is significant as indicating the general appreciation of the intimate relation that exists between the application of philosophical truths to the sciences, and the abstract discussion of these truths to which both the logician and the mathematician contribute. Under the latter point of view, Dr. Elsas's critique of psychophysics, and the review of psychophysical formulae by Köhler in Wundt's *Studien*, form the basis of criticism. Dr. Elsas discusses two fundamental questions: the first, whether Fechner's mathematical formulae are deducible from the observed facts; the second, whether a psychophysic system in Fechner's sense is possible. To both these questions he gives a negative answer. Under the first head he argues that the facts of Weber's law can be expressed by several mathematical formulae, each as good as the other, and yet contradictory among themselves; under the second he considers quantity applicable only to the physiological representative of the sensation, and not to a relation between the physical and the psychical. M. Tannery declares himself in accord with both these positions, though he has other ways of stating them, and is perhaps more ready to expect future experimentation to decide as to the most adequate mathematical statement of psychophysical facts. Köhler's article is a very useful one, because it allows of a survey of the many formulae that have been proposed instead of Fechner's, and inevitably suggests the conviction, as Tannery points out, that the entire topic is obscure by reason of the confusion of distinct questions with one another. Köhler himself accepts the "just observable difference" as a real entity and a unit of measure; and this premise prevents him from recognizing the merit of the work of Delboeuf, a very important contribution to the subject. He lays stress upon the distinction of Wundt between the sensation and the apperception of the same, and perhaps it will be by a firm adherence to this and other distinctions that the mist will be raised from this important part of experimental psychology. A hopeful indication in this direction is furnished by